EME Conference 2024

PTFE (Teflon) VHF Antenna Insulators by George Chaney W5JTL (SK) revisited

by Joe WA8OGS, Richard WC8RK & Hartmut DG7YBN

PTFE (Teflon) VHF Antenna Insulators

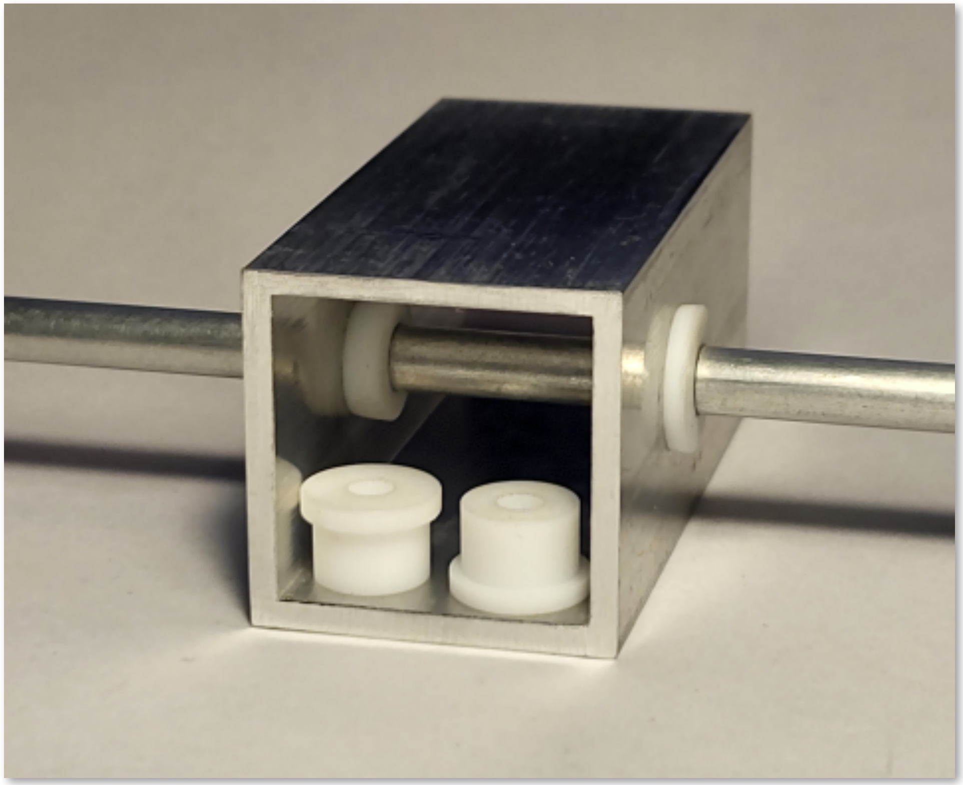
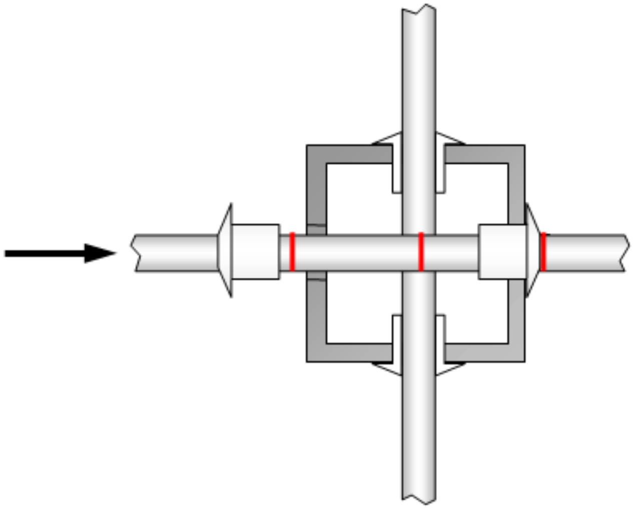


Photo: Boom 25 x 25 x 2, Elem. 3/16”, Source Dubus 3/2024

Howto: Marking elements before pushing them in.



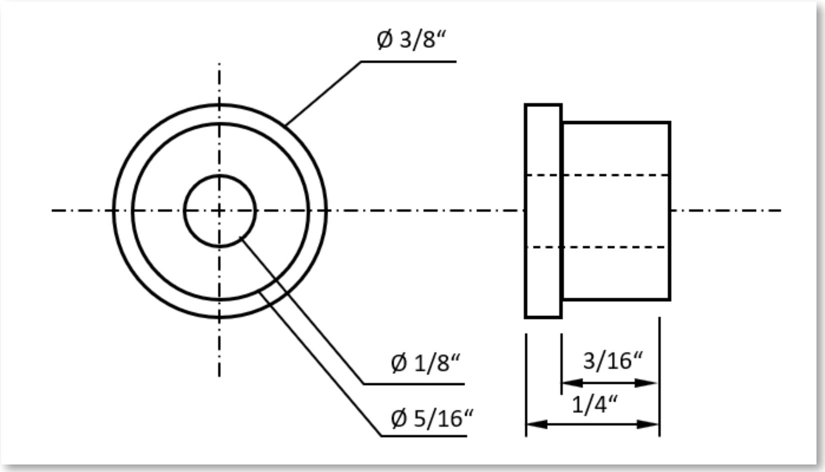
Source DG7YBN.de / Building a Yagi / Thin Elements mounted insulated through Boom

Feasible with Round and Square Booms

Hole in Boom: Ø 5/16”
Center hole for El. 3/16” or 4.0 mm : Ø 1/8”

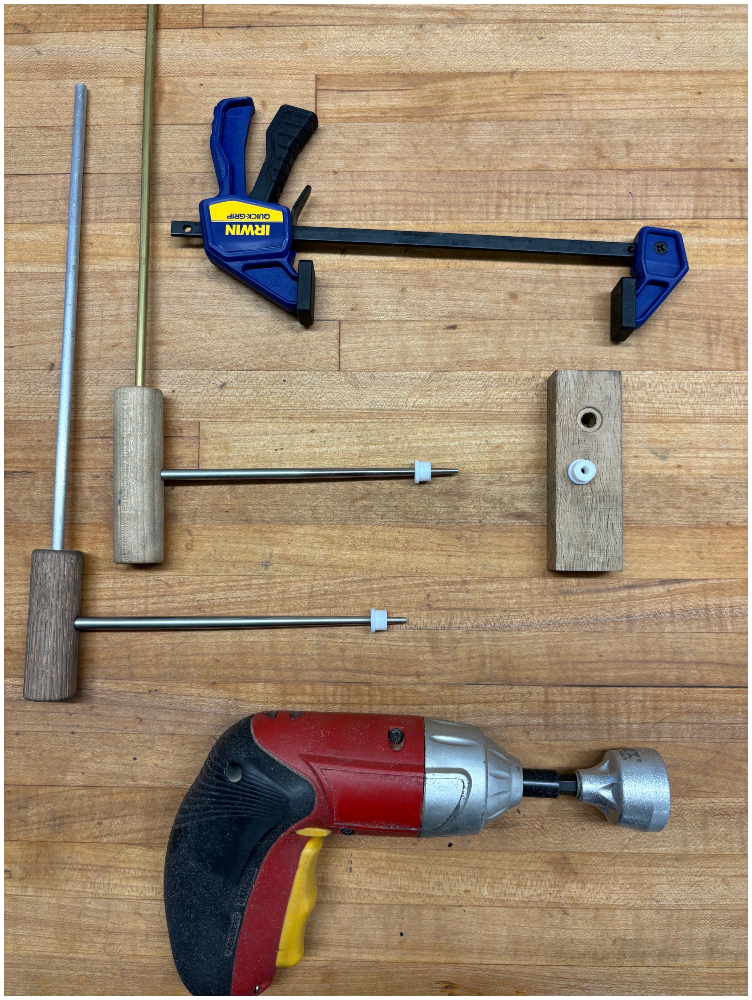
Can be scaled to other dimensions …

Dimensions for 3/16” elements



Tools:

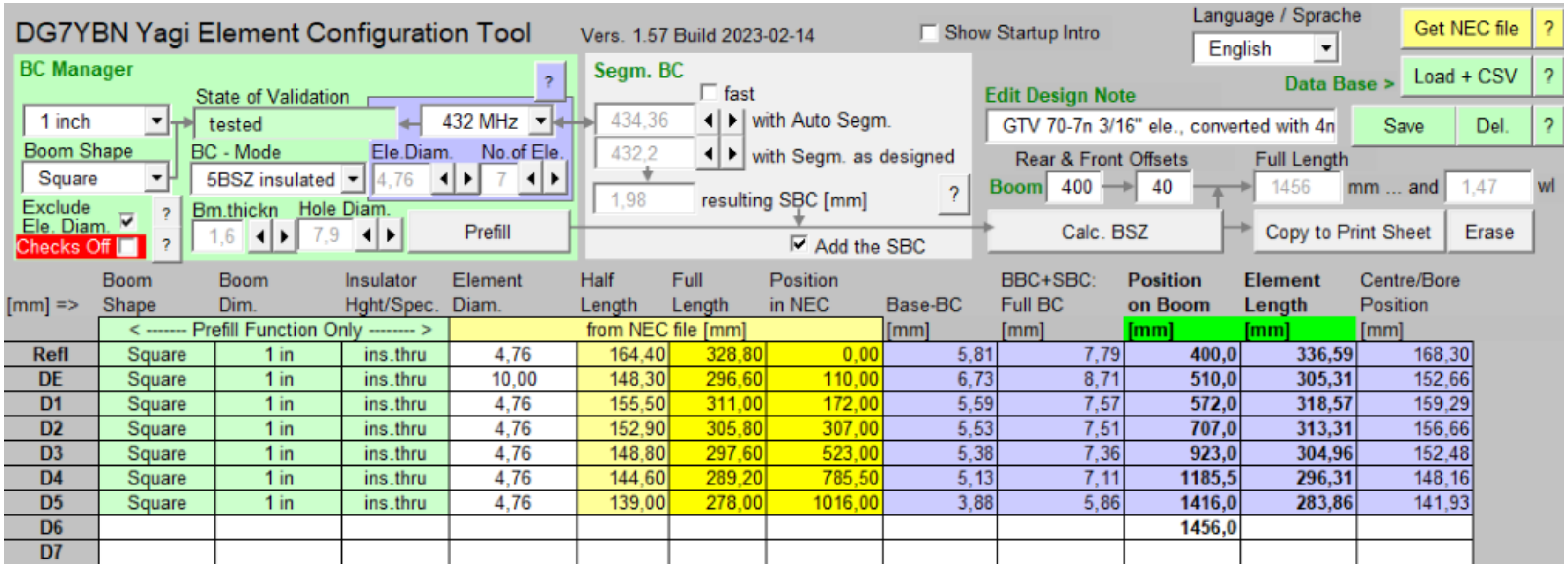
1. Tapered Drill rod to expand PTFE bushing
   - 13/64” for 3/16” elements
   - 11/64” for 4mm elements
   - Countersink on blunt end
2. Small wood dowel handle to push drill rod & elements
3. Wood block with countersink and thru hole
4. Small clamp
5. Chamfering tool



Element insertion and use of expansion tool video

https://youtu.be/ahma2J0vIIE

Test Yagi for PTFE Length factor determination: GTV70-7n



DG7YBN Yagi Element Configuration Tool

Vers. 1.57 Build 2023-02-14

☐ Show Startup Intro

Language / Sprache: English

BC Manager

1 inch

State of Validation: tested

432 MHz

Boom Shape: Square

BC - Mode: 5BSZ insulated

Ele.Diam.: 4,76

No.of Ele.: 7

Exclude Ele. Diam. ☑

Checks Off ☐

Bm.thickn: 1,6

Hole Diam.: 7,9

Segm. BC

☐ fast

434,36 with Auto Segm.

432,2 with Segm. as designed

1,98 resulting SBC [mm]

☑ Add the SBC

Edit Design Note

GTV 70-7n 3/16" ele., converted with 4n

Data Base >

Rear & Front Offsets: **Boom** 400 → 40

Full Length: 1456 mm ... and 1,47 wl

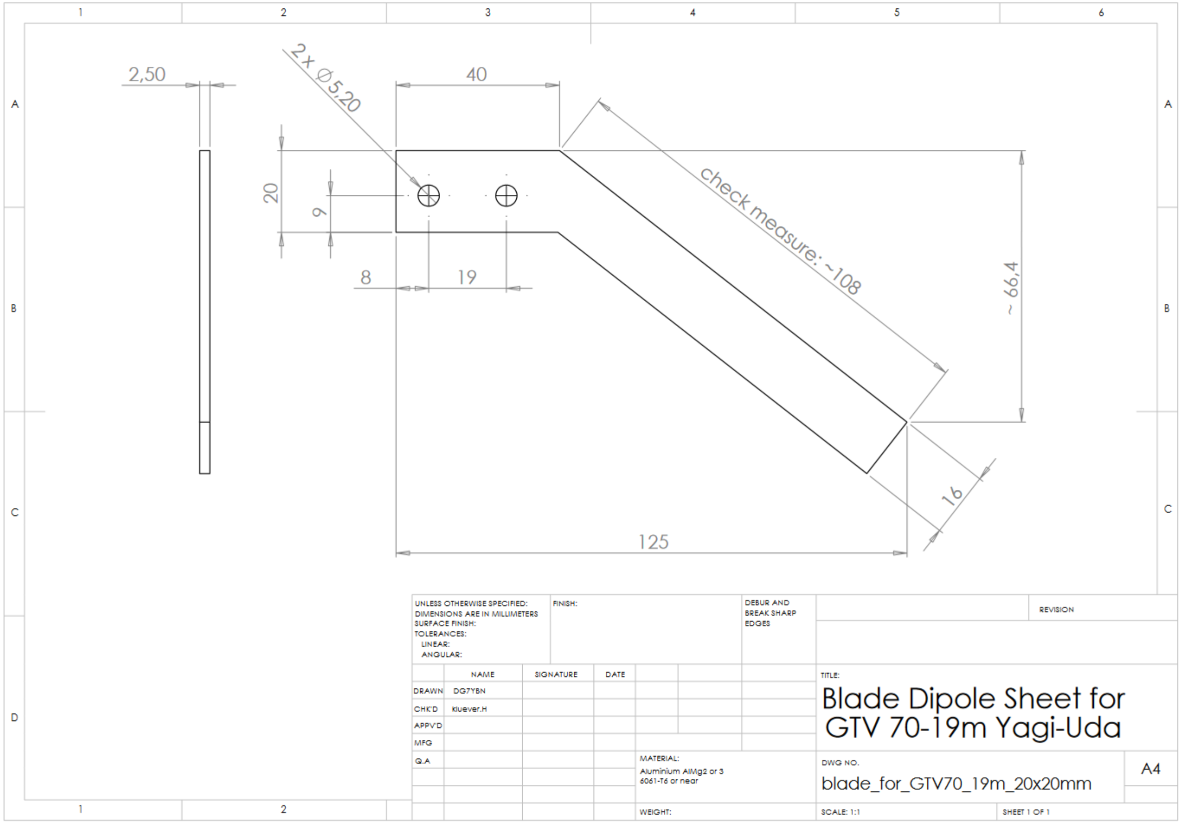
[mm] =>	Boom Shape	Boom Dim.	Insulator Hght/Spec.	Element Diam.	Half Length	Full Length	Position in NEC	Base-BC	BBC+SBC: Full BC	**Position on Boom**	**Element Length**	Centre/Bore Position
	< ------- Prefill Function Only -------- >				from NEC file [mm]			[mm]	[mm]	**[mm]**	**[mm]**	[mm]
Refl	Square	1 in	ins.thru	4,76	164,40	328,80	0,00	5,81	7,79	**400,0**	**336,59**	168,30
DE	Square	1 in	ins.thru	10,00	148,30	296,60	110,00	6,73	8,71	**510,0**	**305,31**	152,66
D1	Square	1 in	ins.thru	4,76	155,50	311,00	172,00	5,59	7,57	**572,0**	**318,57**	159,29
D2	Square	1 in	ins.thru	4,76	152,90	305,80	307,00	5,53	7,51	**707,0**	**313,31**	156,66
D3	Square	1 in	ins.thru	4,76	148,80	297,60	523,00	5,38	7,36	**923,0**	**304,96**	152,48
D4	Square	1 in	ins.thru	4,76	144,60	289,20	785,50	5,13	7,11	**1185,5**	**296,31**	148,16
D5	Square	1 in	ins.thru	4,76	139,00	278,00	1016,00	3,88	5,86	**1416,0**	**283,86**	141,93
D6										**1456,0**		
D7												

PTFE (Teflon) VHF Antenna Insulators

GTV70-7n PTFE Test Antenna built with 2.967mm PTFE factor (longer elements)

			GTV70-7n				
	DG7YBN		PTFE factor				
	Start mm		2.967		Side Length		
Ref	336.59		339.56		155		
DE	305.31		308.28		97*		
D1	318.57		321.54		146		
D2	313.31		316.28		144		
D3	304.96		307.93		139		
D4	296.31		299.28		135		
D5	283.86		286.83		129		
*(309-115)/2		Wing Length					
All numbers are in mm							

GTV70-7n tested with DG7YBN blade DE



UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
ANGULAR:

FINISH:

DEBUR AND BREAK SHARP EDGES

REVISION

	NAME	SIGNATURE	DATE
DRAWN	DG7YBN		
CHK'D	kluever.H		
APPV'D			
MFG			
Q.A			

TITLE:
Blade Dipole Sheet for
GTV 70-19m Yagi-Uda

MATERIAL:
Aluminium AlMg2 or 3
6061-T6 or near

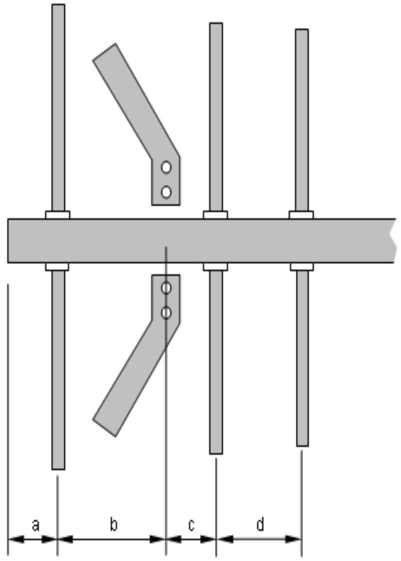
DWG NO.
blade_for_GTV70_19m_20x20mm

A4

WEIGHT:

SCALE: 1:1

SHEET 1 OF 1



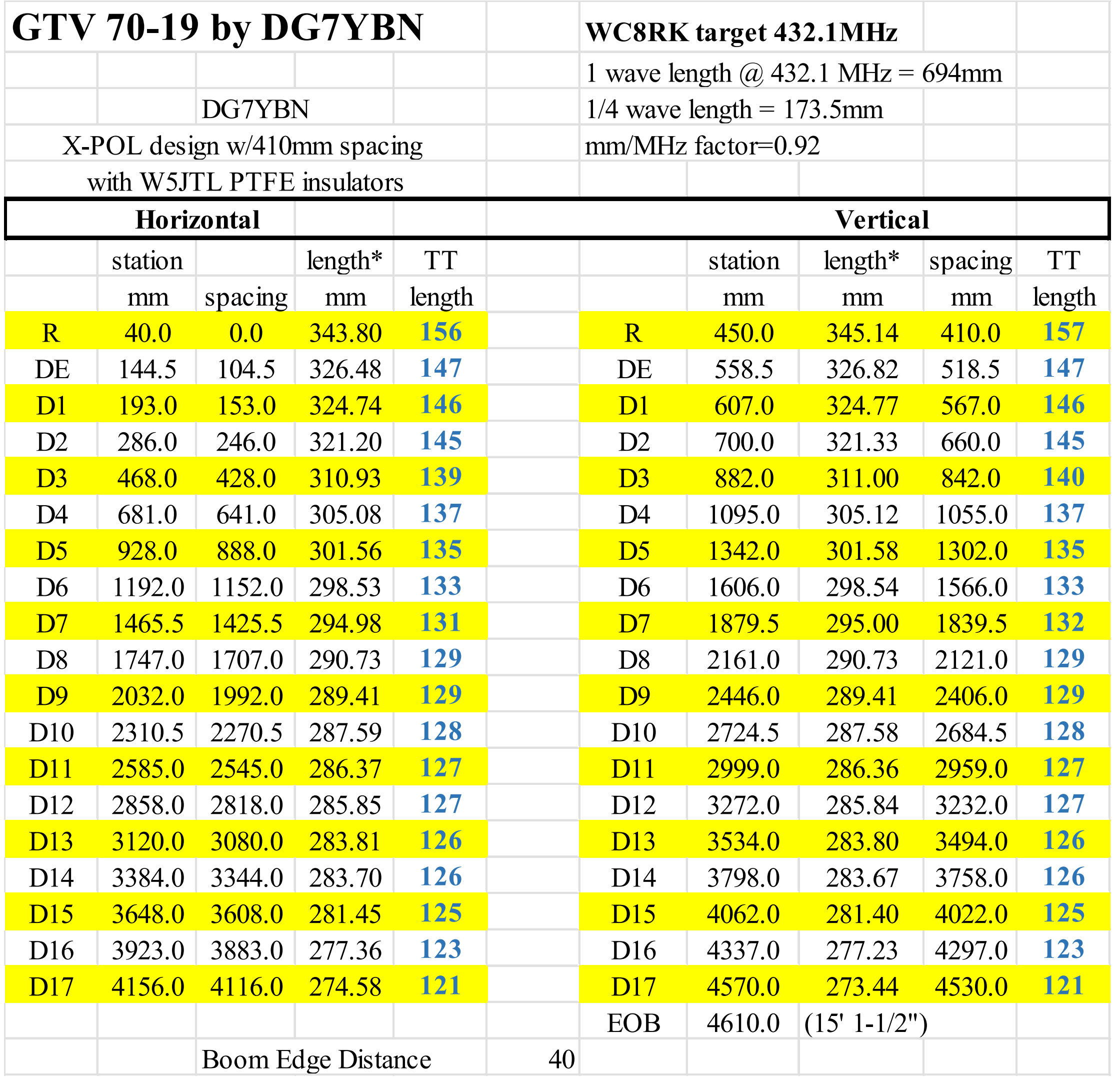
PTFE (Teflon) VHF Antenna Insulators

GTV70-7n	Test Results	Target
Resonate @	432.4MHz	432.1MHz
Return Loss	-50 dB	-29.5 dB
Z	(49.8 +0.1) Ω	(53 + 0.5) Ω
VSWR	1.01:1	1.03:1

Test Yagi GTV70-19 XPOL

Horizontal plane only with 2.967mm PTFE factor

@432.1 MHz as target freq.	
Return Loss	-39 dB
Z	(49.9-1.0) Ω
VSWR	1.02:1



GTV 70-19 by DG7YBN						WC8RK target 432.1MHz				
						1 wave length @ 432.1 MHz = 694mm				
		DG7YBN				1/4 wave length = 173.5mm				
X-POL design w/410mm spacing						mm/MHz factor=0.92				
with W5JTL PTFE insulators										
Horizontal						**Vertical**				
	station		length*	TT			station	length*	spacing	TT
	mm	spacing	mm	length			mm	mm	mm	length
R	40.0	0.0	343.80	**156**		R	450.0	345.14	410.0	**157**
DE	144.5	104.5	326.48	**147**		DE	558.5	326.82	518.5	**147**
D1	193.0	153.0	324.74	**146**		D1	607.0	324.77	567.0	**146**
D2	286.0	246.0	321.20	**145**		D2	700.0	321.33	660.0	**145**
D3	468.0	428.0	310.93	**139**		D3	882.0	311.00	842.0	**140**
D4	681.0	641.0	305.08	**137**		D4	1095.0	305.12	1055.0	**137**
D5	928.0	888.0	301.56	**135**		D5	1342.0	301.58	1302.0	**135**
D6	1192.0	1152.0	298.53	**133**		D6	1606.0	298.54	1566.0	**133**
D7	1465.5	1425.5	294.98	**131**		D7	1879.5	295.00	1839.5	**132**
D8	1747.0	1707.0	290.73	**129**		D8	2161.0	290.73	2121.0	**129**
D9	2032.0	1992.0	289.41	**129**		D9	2446.0	289.41	2406.0	**129**
D10	2310.5	2270.5	287.59	**128**		D10	2724.5	287.58	2684.5	**128**
D11	2585.0	2545.0	286.37	**127**		D11	2999.0	286.36	2959.0	**127**
D12	2858.0	2818.0	285.85	**127**		D12	3272.0	285.84	3232.0	**127**
D13	3120.0	3080.0	283.81	**126**		D13	3534.0	283.80	3494.0	**126**
D14	3384.0	3344.0	283.70	**126**		D14	3798.0	283.67	3758.0	**126**
D15	3648.0	3608.0	281.45	**125**		D15	4062.0	281.40	4022.0	**125**
D16	3923.0	3883.0	277.36	**123**		D16	4337.0	277.23	4297.0	**123**
D17	4156.0	4116.0	274.58	**121**		D17	4570.0	273.44	4530.0	**121**
						EOB	4610.0	(15' 1-1/2")		
		Boom Edge Distance			40					

PTFE (Teflon) VHF Antenna Insulators

Conclusion: PTFE is a great yagi element insulator with very firm grip thanks to the materials creep behavior.

Boom correction recommendations for element lengths:

Use SM5BSZ BC.exe and add a fix offset of

144 MHz - add 0.00 mm

432MHz - add 0.65 mm

Tool kits and PTFE insulators are available